CHAPTER 3

Formulating Airport Land Use Compatibility Policies

OVERVIEW

Compatibility policies, including both criteria and maps, are the central component of any compatibility plan. The purpose of this chapter is to discuss basic concepts and common issues involved in preparing an airport land use compatibility plan and in formulating the policies contained therein. Specific policy guidance regarding noise and safety compatibility concerns is provided in Chapters 7 and 9, respectively.

Topics addressed in chapter include:

- The types of compatibility concerns addressed in compatibility plans;
- Compatibility table and map formats;
- Issues involving existing land uses and other compatibility considerations;
- Factors which limit the degree of restrictiveness ALUCs can apply to land use development; and
- Differences in compatibility planning concerns and approaches among different types of airports.

TYPES OF COMPATIBILITY CONCERNS

As indicated in the preceding chapters, the airport land use compatibility concerns of ALUCs fall under two broad headings identified in state law: noise and safety. However, for the purposes of formulating airport land use compatibility policies and criteria, further dividing these basic concerns into four functional categories is more practical. These categories are:

- *Noise:* As defined by cumulative noise exposure contours describing noise from aircraft operations near an airport.
- *Overflight:* The impacts of routine aircraft flight over a community.
- *Safety:* From the perspective of minimizing the risks of aircraft accidents beyond the runway environment.
- *Airspace Protection:* Accomplished by limits on the height of structures and other objects in the airport vicinity and restrictions on other uses which potentially pose hazards to flight.

The formulation of airport land use compatibility policies and associated criteria in each of these four categories is discussed on the following pages. The emphasis, however, is on ways of *categorizing* and *organizing* the policies rather than on the *concepts* behind them. The latter is the major topic of Part II.

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A summary of basic criteria appropriate for each of the four compatibility categories is presented in the Summary section at the front of this *Handbook*.

For each compatibility category, four features are outlined below:

- *Compatibility Objective:* The objective to be sought by establishment and implementation of the compatibility policies;
- *Measurement:* The scale on which attainment of the objectives can be measured;
- *Compatibility Strategies:* The types of strategies which, when formulated as compatibility policies, can be used to accomplish the objectives; and
- *Basis for Setting Criteria:* The factors which should be considered in setting the respective compatibility criteria.

Noise

Noise is one of the most basic airport land use compatibility concerns. Moreover, at major airline airports, many busy general aviation airports, and most military airfields, noise is usually the most geographically extensive form of airport impact.

The CNEL metric used in California is equivalent to the Day-Night Average Sound Level (DNL) metric used elsewhere in the U.S., but adds the evening weighting not included in DNL. See Chapter 6 for an extended review of aircraft noise metrics.

There is on-going nationwide debate regarding the appropriateness of single-event noise level criteria as a supplement or replacement for cumulative noise level metrics. The argument chiefly made is that cumulative noise level metrics may not adequately identify some aspects of noise exposure effects, particularly within the context of assessing the environmental impacts of airport improvement projects. In response, the Federal Interagency Committee on Noise (FICON) has reviewed federal policies governing the assessment of airport noise impacts. FICON's most recent technical conclusion is that "there are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL (CNEL in California) cumulative noise exposure metric." Therefore, this *Handbook* continues to use CNEL as the primary tool for the purpose of land use compatibility planning. This does not, however, limit an ALUC from including other noise measurement tools in its consideration of potential aircraft noise impacts, especially with respect to overflight issues as discussed below.

➤ **Compatibility Objective**—The clear objective of noise compatibility criteria is to minimize the number of people exposed to frequent and/or high levels of airport noise capable of disrupting noise-sensitive activities.

➤ **Measurement**—For the purposes of airport land use compatibility planning, noise generated by the operation of aircraft to, from, and around an airport is primarily measured in terms of the cumulative noise levels of all aircraft operations. In California, the cumulative noise level metric established by state regulations, including for airport noise, is the Community Noise Equivalent Level (CNEL). This metric provides a single measure of the average sound level in decibels (dB) to which any point near an airport is exposed. To reflect an assumed greater community sensitivity to nighttime and evening noise, events during these periods are counted as being louder than actually measured. Cumulative noise levels are usually illustrated on airport area maps as contour lines connecting points of equal noise exposure. Mapped noise contours primarily show areas of significant noise exposures—ones affected by high concentrations of aircraft takeoffs and landings.

The calculation of cumulative noise levels depends upon the number, type, and time of day of aircraft operations, the location of flight tracks, and other data described in Chapter 6. For airports with airport traffic control towers, some of these inputs can be derived from recorded data. Noise monitoring and radar flight tracking data available for airports in most metropolitan areas are other sources of valuable information. At most airports, though, the individual input variables must be estimated. The important point to be made here is that, despite their computer-generated origin, the location of noise contours is not necessarily precise. Where extensive noise monitoring and flight tracking data are available, current contours can be accurate to within ±1 dB. Elsewhere, the level of accuracy has generally been found to be about ±3 dB. Contours representing projections of future noise levels are inherently even less precise.

- **Compatibility Strategies**—The basic strategy for achieving noise compatibility in an airport vicinity is to limit development of land uses which are particularly sensitive to noise. The most acceptable land uses are ones which either involve few people (especially people engaged in noise-sensitive activities) or generate significant noise levels themselves (such as other transportation facilities or some industrial uses).

  On occasion, local considerations outweigh noise impacts and result in decisions by local land use jurisdictions or even ALUCs to allow residential development in locations where this use would normally be considered incompatible. In such circumstances, approval of the development should be conditioned upon dedication of an avigation easement and requirements for sufficient acoustic insulation of structures to assure that aircraft noise is reduced to an interior noise level of 45 dB CNEL or less.

- **Basis for Setting Criteria**—Compatibility criteria related to cumulative noise levels are well-established in federal and state laws and regulations. The basic state criterion sets a CNEL of 65 dB as the maximum noise level normally compatible with urban residential land uses. For many airports and many communities, 65 dB CNEL is too high for land use planning purposes. A process called "normalization" is one means of adjusting the criteria to reflect ambient sound levels, the community's previous exposure to noise, and other local characteristics as outlined in Chapter 7. This process helps to determine what CNEL is of significance to that particular community. Once the baseline maximum acceptable noise level for residential uses is established, criteria for other land uses can be set in a manner consistent with this starting point.

Overflight

As the term is applied herein, an *overflight* means any distinctly visible and audible passage of an aircraft, not necessarily one which is directly overhead.

As discussed in Chapter 7, experience at many airports has shown that noise-related concerns do not stop at the boundary of the outermost mapped CNEL contour. Many people are sensitive to the frequent presence of aircraft overhead even at noise low levels. These reactions can mostly be expressed in the form of *annoyance*.

At many airports, particularly air carrier airports, complaints often come from locations beyond any of the defined noise contours. Indeed, heavily used flight corridors to and from metropolitan areas are known to generate noise complaints 50 miles or more from the associated airport. The basis for such complaints may be a desire and expectation that outside noise sources not be intrusive—or, in some circumstances, even distinctly audible—above the quiet, natural background noise level. Elsewhere, especially in locations beneath the traffic patterns of general aviation airports, a fear factor also contributes to some individuals' sensitivity to aircraft overflights.

While these impacts may be important community concerns, the question of importance here is whether any land use planning actions can be taken to avoid or mitigate the impacts or otherwise address the concerns. Commonly, when overflight impacts are under discussion in a community, the

focus is on modification of the flight routes. Indeed, some might argue that overflight impacts should be addressed solely through the aviation side of the equation—not only flight route changes, but other modifications to where, when, and how aircraft are operated.

ALUCs are particularly limited in their ability to deal with overflight concerns. For one, they have no authority over aircraft operations. The most they can do to bring about changes is to make requests or recommendations. Even with regard to land use, the authority of ALUCs extends only to proposed new development.

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ALUCs are encouraged to consider aircraft overflight annoyance concerns when developing airport compatibility plans.

These limitations notwithstanding, there are steps which ALUCs can and should take to help minimize overflight impacts.

- **Compatibility Objective**—In an idealistic sense, the compatibility objective with respect to overflight is the same as for noise: avoid land use development which can lead to annoyance and complaints. However, given the extensive geographic area over which the impacts occur, this objective is unrealistic except relatively close to the airport. A more realistic objective therefore might be to promote conditions under which annoyance will be minimized. Possible strategies in this regard are described below.

- **Measurement**—Determining where to draw boundaries around areas of potentially significant overflight noise exposure is difficult because these locations extend beyond the well-defined CNEL contours which indicate areas of high noise exposure. CNEL contours are not very precise at low noise levels, especially where aircraft flight tracks are widely divergent. The general locations over which aircraft regularly fly as they approach and depart an airport is thus a better indicator of overflight annoyance concerns. For general aviation airports, such locations include areas beneath the standard airport traffic patterns, the portions of the pattern entry and departure routes flown at normal traffic pattern altitude, and perhaps additional places which experience a high concentration of overflights. Also, at all types of airports, common IFR arrival and departure routes can produce overflight concerns, sometimes many miles from the airport.

- **Compatibility Strategies**—As noted above, the ideal land use compatibility strategy with respect to overflight annoyance is to avoid development of residential and other noise-sensitive uses in the affected locations. To the extent that this approach is not practical, three different (but not mutually exclusive) strategies are apparent.

  Descriptions and discussion of these buyer awareness measures are included later in this chapter.

  - One strategy is to help people with above-average sensitivity to aircraft overflights—people who are highly *annoyed* by overflights—to avoid living in locations where frequent overflights occur. This strategy involves making people more aware of an airport's proximity and its current and potential aircraft noise impacts on the community before they move to the area. This can be accomplished through buyer awareness measures such as dedication of avigation or overflight

easements, recorded deed notices, and/or real estate disclosure statements. In new residential developments, posting of signs in the real estate sales office and/or at key locations in the subdivision itself can be further means of alerting the initial purchasers about the impacts (signs are of little long-term value, however).

- A second strategy is to minimize annoyance by reducing the intrusiveness of aircraft noise above normal background noise levels. Because ALUCs and local land use authorities have no way of regulating aircraft noise levels, the other option is to promote types of residential land uses which tend to mask the intrusive noise. In this regard, multi-family residences—because they tend to have comparatively little outdoor living areas, fewer external walls through which aircraft noise can intrude, and relatively high noise levels of their own—are preferable to single-family dwellings. Particularly undesirable are "ranchette" style residential areas consisting of large (about an acre on average) lots. Such developments are dense enough to expose many people to overflight noise, yet sufficiently rural in character that background noise levels are likely to be low.
- Finally, for highly noise-sensitive uses, acoustical treatment of the structures, together with dedication of an avigation easement, may be appropriate.

➤ **Basis for Setting Criteria**—The basis for setting criteria is primarily the experience and knowledge that airport proprietors and airport land use commissions have about the noise sensitivity of the specific communities involved.

The overflight issue is being studied by the FAA as part of regional air traffic control and as part of noise issues in national parks and wilderness areas. Useful guidance may come out of these efforts in the future.

Safety

Compared to noise, safety is in many respects a more difficult concern to address in airport land use compatibility policies. A major reason for this difference is that safety policies address uncertain events which *may occur* with *occasional* aircraft operations, whereas noise policies deal with known, more or less predictable events which *do occur* with *every* aircraft operation. Because aircraft accidents happen infrequently and the time, place, and consequences of their occurrence cannot be predicted, the concept of *risk* is central to the assessment of safety compatibility. From the standpoint of land use planning, two variables determine the degree of risk posed by potential aircraft accidents:

- *Accident Frequency:* Where and when aircraft accidents occur in the vicinity of an airport;
- *Accident Consequences:* Land uses and land use characteristics which affect the severity of an accident when one occurs.

➤ **Compatibility Objective**—The overall objective of safety compatibility criteria is simply to minimize the risks associated with potential aircraft accidents. There are two components to this objective, however:

- *Safety on the Ground:* The most fundamental safety compatibility component is to provide for the safety of people and property on the ground in the event of an aircraft accident near an airport.
- *Safety for Aircraft Occupants:* The other important component is to enhance the chances of survival of the occupants of an aircraft involved in an accident which takes place beyond the immediate runway environment.

➤ **Measurement**—In measuring the degree of safety concerns around an airport, the frequency component of risk assessment is most important: what is the potential for an accident to occur? As mentioned above, there are both *where* and *when* variables to the frequency equation:

- *Spatial Element:* The spatial element describes *where* aircraft accidents can be expected to occur. Of all the accidents which occur in the vicinity of airports, what percentage occur in any given location?
- *Time Element:* The time element adds a *when* variable to the assessment of accident frequency. In any given location around a particular airport, what is the chance that an accident will occur in a specified period of time?

Except with respect to airspace protection, ALUCs have virtually no powers to implement actions which can reduce the *frequency* of aircraft accidents. An understanding of the *spatial* element of accident frequency as examined in Chapters 8 and 9 is nevertheless essential to ALUC development of effective measures to limit the potential *severity* of accidents.

➤ **Compatibility Strategies**—Safety compatibility strategies focus on the *consequences* component of risk assessment. Basically, the question is: what land use planning measures can be taken to reduce the severity of an aircraft accident if one occurs in a particular location near an airport? Although there is a significant overlap, specific strategies must consider both components of the safety compatibility objective: protecting people and property on the ground; and enhancing safety for aircraft occupants. In each case, the primary strategy is to limit the intensity of use (the number of people concentrated on the site) in locations most susceptible to an off-airport aircraft accident. This is accomplished by:

- *Density and Intensity Limitations:* Establishment of criteria limiting the maximum number of dwellings or people in areas close to the airport is the most direct method of reducing the potential severity of an aircraft accident.
- *Open Land Requirements:* Creation of requirements for open land near an airport addresses the objective of enhancing safety for the occupants of an aircraft forced to make an emergency landing away from a runway.
- *Highly Risk-Sensitive Uses:* Certain critical types of land uses—particularly schools, hospitals, and other uses in which the mobility of occupants is effectively limited—should be avoided near the ends of runways regardless of the number of people involved. Aboveground storage of large quantities of highly flammable or hazardous materials also should be avoided near airports.

Under many circumstances, one means of implementing both the density limitations and open land requirements strategies is through clustering of development. This concept is discussed in Chapter 9.

➤ **Basis for Setting Criteria**—Setting safety compatibility criteria presents the fundamental question of what is safe. Expressed in another way: what is an *acceptable risk*? In one respect, it may seem ideal to reduce risks to a minimum by prohibiting most types of land use development from areas near airports. However, as addressed later in this chapter, there are usually costs associated with such high degrees of restrictiveness. In practice, safety criteria are set on a progressive scale with the greatest restrictions established in locations with the greatest potential for aircraft accidents.

- *Established Guidance:* As noted in Chapter 9, little established guidance is available to ALUCs regarding how restrictive to make safety criteria for various parts of an airport's environs. Unlike the case with noise, there are no formal federal or state laws or regulations which set safety criteria for airport area land uses for civilian airports except within *runway protection zones* (and with regard to airspace obstructions as described separately in the next section). Federal Aviation Administration safety criteria primarily are focused on the runway and its immediate environment. Runway protection zones—then called *clear zones*—were originally established mostly for the purpose of protecting the occupants of aircraft which overrun or land short of a runway. Now, they are defined by the FAA as intended to enhance the protection of people and property on the ground.
- *New Research:* To provide a better foundation for establishment of safety criteria in other portions of the airport environs, extensive research into the distribution of general aviation aircraft accident locations was conducted in conjunction with the 1993 edition of this *Handbook* and expanded as an initial step in preparation of the present edition. The results are outlined in Appendix G and further examined in Chapter 9. Available information regarding air carrier aircraft accidents is presented as well. However, even with this new data on which to base safety compatibility decisions, the question is still ultimately one of what is acceptable to the local community.

Airspace Protection

Relatively few aircraft accidents are caused by land use conditions which are hazards to flight. The potential exists, however, and protecting against it is essential to airport land use safety compatibility.

Protection of airport airspace is one of the few actions which ALUCs can take to help reduce the *frequency* of aircraft accidents.

➤ **Compatibility Objective**—Because airspace protection is in effect a safety factor, its objective can likewise be thought of in terms of risk. Specifically, the objective is to avoid development of land use conditions which, by posing hazards to flight, can increase the risk of an accident occurring. The particular hazards of concern are:

- Airspace obstructions;
- Wildlife hazards, particularly bird strikes; and
- Land use characteristics which pose other potential hazards to flight by creating visual or electronic interference with air navigation.

➤ **Measurement**—The measurement of requirements for airspace protection around an airport is a function of several variables including: the dimensions and layout of the runway system; the type of operating procedures established for the airport; and, indirectly, the performance capabilities of aircraft operated at the airport.

Excerpts from Part 77 are included in Appendix B.

- *Airspace Obstructions:* Whether a particular object constitutes an airspace obstruction depends upon the height of the object relative to the runway elevation and its proximity to the airport. The acceptable height of objects near an airport is most commonly determined by application of standards set forth in Part 77 of the Federal Aviation Regulations. These regulations establish a three-dimensional space in the air above an airport. Any object which penetrates this volume of airspace is considered to be an obstruction and may affect the aeronautical use of the airspace.

As discussed in Chapter 8, a second set of airspace surfaces around airports are ones defined by the *U.S. Standard for Terminal Instrument Procedures* (TERPS). These criteria are used in the design of instrument approach procedures. In most cases, height limitations under TERPS are less restrictive than under FAR Part 77. However, in some situations (such as an approach which is not aligned with the runway), TERPS surfaces need to be considered in order to fully protect an airport's airspace.

- *Wildlife and Other Hazards to Flight:* The significance of other potential hazards to flight is principally measured in terms of the hazards' specific characteristics and their distance from the airport and/or its normal traffic patterns.

➤ **Compatibility Strategies**—Compatibility strategies for the protection of airport airspace are relatively simple and are directly associated with the individual types of hazards:

- *Airspace Obstructions:* Buildings, antennas, other types of structures, and trees should be limited in height so as not to pose a potential hazard to flight.
- *Wildlife and Other Hazards to Flight*: Land uses which may create other types of hazards to flight near an airport should be avoided or modified so as not to include the offending characteristic.

➤ **Basis for Setting Criteria**—The criteria for determining airspace obstructions and other hazards to flight have been long-established in FAR Part 77 and other Federal Aviation Administration regulations and guidelines. Also, state of California regulation of obstructions under the State Aeronautics Act (Public Utilities Code, Section 21659) is based on FAR Part 77 criteria.

COMPATIBILITY CRITERIA TABLES AND MAPS

Identification of land use compatibility strategies such as those outlined in the preceding section is only one part of the process of developing compatibility policies. The other piece of the puzzle is to relate these strategies to the airport environs both geographically and for various categories of land uses. This is done by means of a compatibility criteria table or tables—although sometimes a list or outline format is used—together with one or more compatibility zone maps.

- **Tables**—Compatibility criteria tables provide the measures by which land use categories of characteristics can be evaluated for compatibility with the airport impacts identified for various portions of the airport environs.
- **Maps**—Compatibility maps show where the various criteria geographically apply within the airport vicinity. Generally, the maps divide the airport environs into a series of zones in which a progressively greater degree of land use restrictions apply the closer the zone is to the airport.

Compatibility Criteria Table and Map Formats

Three basically distinct table and map formats have evolved among the compatibility plans adopted by ALUCs in California. As with many other facets of compatibility planning, there are advantages and disadvantages to each choice with none being clearly the best.

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ALUCs are encouraged to consider All of these formats are acceptable options for airport land use compatibility plans.

Separate Criteria Tables and Maps

The traditional approach to compatibility criteria tables and maps is to have separate sets for each type of impact. For noise, the table indicates whether each land use classification is or is not acceptable within various ranges of noise exposure as measured on the CNEL scale. For safety, the relationship is between each land use category and the degree of accident risk at locations around the airport. An airspace protection map indicates the allowable heights of objects near the airport. Finally, overflight concerns can be addressed by a map showing where any associated compatibility policies apply.

- **Advantages**—The chief advantage to this approach is that the relationships between the noise and safety concerns and the associated criteria are relatively obvious. For example, at a minimum, residences should not be exposed to noise levels above a CNEL of 65 dB and schools and shopping centers should not be situated in a runway protection zone.

  A second advantage is that the resulting large number of zones (because noise and safety each have their own set of zones and airspace protection is also separately considered) gives greater flexibility in adjusting the compatibility criteria to suit the circumstances. This flexibility can be particularly important in urban areas where site design and other specific features of the development can become critical to determining the compatibility of a proposed land use.
- **Disadvantages**—The disadvantages involve ease of use and occasional confusion in application. Although technically sound, the use of separate criteria and maps can be more complicated and require greater understanding of airport land use compatibility concepts. For any given land use classification or individual development proposal to be evaluated, it must be checked against multiple sets of criteria tables and maps—noise, safety, and overflight impacts—as well as a map of protected airspace. The confusion sometimes arises because of the lack of coordination between the impact assessments. For a given location, one type of land

use may be acceptable with respect to noise, but not for safety; another use may be just the opposite; and, taken together, most forms of urban land use development may sometimes appear to be ruled out.

Another disadvantage is the tendency to rigidly apply the delineated zone boundaries, especially for noise, to the evaluation of a particular land use project or action. Although often advantageous from the standpoint of planning practice, rigid application of the boundaries implies a degree of precision which does not exist in the measurement of the airport impacts.

Composite Criteria Table and Map

A different approach, one which has become increasingly common, simplifies compatibility assessments by condensing the various factors down to a single set of criteria presented in one table and one map for each airport. The map defines a small number of discrete zones—preferably no more than five or six—which represent locations with similar *combinations* of noise, safety hazard, and overflight exposure. Airspace protection criteria can sometimes be included as well.

An example of such zones might combine the various factors as follows:

Zone	Location / Compatibility Factors
A	➤ Runway primary surface and runway protection zones
B1	➤ Inner segment of runway approaches ➤ High noise levels; high safety concerns ➤ Low-altitude aircraft overflight ➤ Height limits as little as 50 feet
B2	➤ Adjacent to runway ➤ High noise; moderate safety concerns ➤ Normally no overflights ➤ Transitional surface height limit restrictions
C1	➤ Outer portion of runway approach routes, particularly instrument approaches ➤ Moderate noise; moderate safety concerns ➤ Overflight at less than normal traffic pattern altitude
C2	➤ Remainder of common traffic patterns ➤ Overflight at traffic pattern altitude ➤ Potential overflight annoyance concerns
D	➤ Less frequent overflights ➤ Remainder of airspace protection surfaces

➤ **Advantages**—One advantage to the composite approach is that it allows most land uses to be evaluated with quick reference to a single table and map. More significantly, though, is that it allows more flexibility in the *mapping* of compatibility zones (as compared to the separate criteria and map format which offers higher flexibility in defining the compatibility criteria). As discussed later in this chapter, generic boundaries can be drawn for a limited number of airport classes. These boundaries can then be applied to all similar airports in the ALUC's jurisdiction and adjusted as necessary to reflect atypical airport operational characteristics, local geographic boundaries, and established land uses.

- **Disadvantages**—The major disadvantage to combining compatibility criteria into a single table and map is that the basis for location of the zone boundaries is not always clear. If more detailed assessment of a complex land use development proposal is necessary, reference to separate noise and safety compatibility tables and maps is often still required.

Detailed Land Use Map

A final format found among some compatibility plans is a detailed land use map comparable to ones found in general plans or specific plans. This format is most likely to be utilized when the ALUC adopts a compatibility plan which is also prepared for local agency adoption as a specific plan. Depending upon the extent to which the land use categories reflect airport compatibility concerns, a detailed land use map conceivably can bypass the need for compatibility criteria tables.

- **Advantages**—Probably the most significant advantage of the detailed land use map approach to compatibility mapping is that it enables the same map to be adopted by the ALUC as a compatibility plan and by the local agency as a specific plan. Because the maps and plans (or at least the airport-related portions of them) are identical, the two are automatically consistent with each other.
- **Disadvantages**—A major disadvantage of this approach is that it entails more work to prepare than is necessary for the other formats. A detailed land use map prepared for a specific plan must take into account factors which are not of concern to the ALUC. Close cooperation between the ALUC and the county or city preparing the specific plan is necessary to assure that all essential factors are addressed. Also a potential disadvantage is that a detailed land use map of this type pertains only to a single airport and the compatibility criteria on which it is based may not correspond very closely to criteria used in compatibility plans for other airports within the ALUC's jurisdiction.

Categorization of Land Uses

The other variation in the formatting of compatibility criteria pertains to how land uses are categorized in the compatibility table or tables. There are two different approaches to the listing of land uses. Both are common among ALUC compatibility plans and, as with the overall format of the tables, each has advantages and disadvantages.

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Either of these two formats is acceptable. In both cases, however, attention should be paid to minimizing the shortcomings listed among each option's disadvantages.

Detailed Listing Format

One approach to land use categorization is to divide the full range of land uses into specific classes. The number of classifications might be relatively few in number—residential, commercial, industrial, public facility, etc.—as commonly found on general plans or specific plans. Alternatively, a much more narrowly defined listing might be utilized—one in which the broader land use categories are divided into more precise subcategories.

The detailed listing approach to land use categories works with either separate or composite compatibility tables and maps. It is essential if a detailed land use map approach is used.

- **Advantages**—The advantage of the detailed listing approach is that it removes most of the need for interpretation of standards as required within the performance-oriented categories. Each listed use can be denoted as either *compatible* or *incompatible* with a given level of airport impacts. This greatly simplifies the task of local planners when they must evaluate an individual development proposal either with respect to the ALUC's compatibility plan directly or the local agency's general or specific plan.

- **Disadvantages**—The major disadvantage of this method is that, unless the land use categories are defined very narrowly, the usage intensity (the number of people per acre) and other characteristics which affect compatibility might cover a wide range. Indicating that a particular land use is compatible with the airport could result in development of an activity which clearly exceeds the intensity considered acceptable. Oppositely, listing a land use as incompatible might preclude a development which could be a good airport neighbor. Some ALUCs resolve this problem by including a third consistency category: *conditionally compatible*. Assessment of the compatibility of an individual development proposal then usually requires returning to functionally oriented criteria as described below.

  Another potential difficulty with including a detailed listing of land uses in a compatibility plan is that the selected categories may not conform to those used by the local land use jurisdictions. This is particularly likely to occur when the compatibility plan covers multiple airports and encompasses several counties and/or cities, each with its own set of land use categories.

Functional or Performance-Oriented Characteristics

This approach entails dividing land uses according to characteristics related to the previously described compatibility planning strategies. It applies primarily to when a composite compatibility table and map are utilized, but could also be employed as a means of evaluating safety compatibility. The number of categories needed is thus kept small. No distinctions are made among different types of land uses with similar functional or performance-oriented characteristics—for example, between an office and a retail store which attract the same number of people in buildings equivalent in size. When this method of land use categorization is used in a compatibility table, the result for most categories is not an indication of whether the land use is compatible or incompatible. Rather, the table establishes a set of criteria based upon specified performance measures which, if satisfied, will result in compatible land use.

A typical set of performance-oriented land use characteristics and their respective compatibility measures is as follows:

- **Residential Density**—For airport compatibility purposes, the chief distinguishing feature among residential land uses is the number of dwelling units per acre. To be compatible with airport activities, the number of dwelling units per acre should not exceed the criterion specified for the compatibility zone where the use would occur.

- **Nonresidential Usage Intensity**—The most significant factor among most other types of land use development is the number of people attracted by the use. Safety is the principal concern in this regard, although noise could also be evaluated in this manner. With the exception of certain sensitive uses, the nature of the activity associated with the actual land use is not highly relevant to airport land use compatibility objectives.

See Appendix C for guidance on methods of calculating intensities of nonresidential land uses.

- **Sensitive Uses**—This category includes land uses which, because of their special sensitivity, should be excluded from certain locations near airports even if they meet other quantitative criteria. Children's schools, day care centers, hospitals, nursing homes, and other highly risk-sensitive uses are primary examples. Uses involving storage of large quantities of hazardous materials also fit into this category on the basis of safety. In terms of noise, uses such as an amphitheater might be considered unacceptable near an airport regardless of the number of people exposed to the noise.

- **Open Land**—Requirements for open land usable for the emergency landing of aircraft near an airport apply regardless of the overall land use classification of the property. The associated criteria indicate what percentage of the land area in each compatibility zone should be devoted to functional open space.

- **Permitted Heights**—Another land use characteristic that can be incorporated into a composite compatibility table is the height of structures which can clearly be attained without penetration of the airport airspace. Including permitted heights as a criterion in a composite compatibility zone works best at airports in relatively level terrain. At airports where elevations of the surrounding terrain vary substantially, special provisions might need to be made to account for the lack of consistent relationship between the height permitted and the location of the individual compatibility zones.

Advantages and disadvantages of this style of land use categorization include:

- **Advantages**—The principal advantage of performance-oriented categorization of land uses is that this method directly addresses factors pertinent to airport land use compatibility. Recognition is given to significant land use characteristics which might not be distinguished in a traditional listing of land uses.

- **Disadvantages**—The significant disadvantage of performance-based land use categories is that assessing the compatibility of a particular land use designation or individual development proposal requires interpretation of the associated criteria (except for residential uses). If, for example, data

regarding the usage intensity is not available, then compatibility evaluation will require reliance on information sources (building and fire code standards, for example) which may not accurately reflect the aviation-related concerns. The results may not always be consistent with previous determinations.

Preparing Compatibility Maps

Regardless of which format is used for the compatibility table and maps, several important factors should be considered when preparing the maps for a particular airport.

Basic Determinants of Compatibility Zone Boundaries

The manner in which compatibility zone boundaries are determined depends to some extent upon the map format utilized.

➤ **Separate Compatibility Maps**—With this format, each map directly reflects the associated airport impacts:

Figure 6G in Chapter 6 depicts an example of a set of noise contours.

- *Noise:* Community Noise Equivalent Level (CNEL) contours directly from the computer output or with minor graphical clean-up can be utilized. The lowest CNEL contour depicted may vary depending on how sensitive the surrounding community is to aircraft noise.

Accident location data gathered for the preparation of this *Handbook* can help to refine the boundaries of safety compatibility zones for individual airports. See the discussion in Chapter 9.

- *Safety:* ALUCs which use separate mapping of each compatibility concern typically establish three to six safety zones reflecting assumed accident potential. The distinct zones might include: the runway protection zone; an approach zone (perhaps divided into two segments); a traffic pattern overflight zone; and sometimes a zone encompassing areas adjacent to the runway.

An example of a typical civilian airport airspace plan is included in Chapter 9.

- *Airspace Protection:* The height-limit component of airspace protection can be mapped from the Federal Aviation Regulations, Part 77, airspace plan prepared for the airport. Critical TERPS surfaces can be added as appropriate. Zones related to bird strike hazards and visual and electronic interference concerns are seldom mapped.

- *Overflight:* Areas where overflight compatibility criteria apply are usually shown on noise or safety compatibility maps rather than separately.

➤ **Composite Criteria Maps**—Creation of a map of composite compatibility zones for an airport starts with preparation of the separate compatibility maps as described above. These maps are then reviewed in combination with each other to identify locations where the overall extent of noise, risk, and other impacts are similar. Preferably, no more than five or six composite zones should be created.

Even when a composite map is used for noise, safety, and overflight compatibility evaluation, a separate map is usually prepared to allow precise assessment of airspace protection requirements.

➤ **Detailed Land Use Map**—As with the composite criteria map format, preparation of a detailed land use map requires that the factors affecting land use choices be individually considered and mapped, then combined into a single map using an overlay process. The difference from a composite compatibility criteria map is that the detailed land use map must also take into account nonaviation determinants of land use designations. As indicated in the preceding discussion of land use categories, the designations used in a detailed land use compatibility map should divide the land use types into a sufficient number of categories to enable various degrees of airport compatibility concerns to be recognized. For example, commercial uses should be distinguished as low intensity (few people per acre) versus high intensity (many people per acre).

Relationship of Zone Boundaries to Geographic Features

The location of airport-related impacts is mostly determined by the location of runways, flight routes, and other aviation-related factors, not geographic features of the airport environs. While defining compatibility zone boundaries based strictly on the impacts provides the closest relationship to those impacts, the resulting maps are not as easy for local planners to use. The alternative is to adjust the zone boundaries to follow geographic features, existing land use development, and other local land use characteristics. By so doing, situations where a compatibility zone boundary splits a parcel can be minimized.

Adjustment of boundary lines is generally more practical in urban areas, because they offer more choices of roads, parcel lines, and other geographic features, than in rural locations where these features are more widely spaced. Also, the composite criteria and detailed land use map formats better lend themselves to boundary adjustments than do separate compatibility maps.

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Adjustment of compatibility zone boundaries to follow geographic features is acceptable provided that the area within each of the resulting zones is reasonably uniform with respect to the extent of airport-related impacts which it experiences.

Relationship of Compatibility Zones to Overall Planning Area

The overall planning or influence area for an airport is normally the area encompassed by a composite of each of the individual compatibility zones. For most civilian airports, the most geographically extensive compatibility concern is the airspace protection area defined by the outer edge of the FAR Part 77 conical surface. This distance equals 9,000 feet from the runway primary surface for small airports with no instrument approaches and 14,000 feet for most other civilian airports (the primary surface extends 200 feet beyond the runway end).

There are exceptions to this basic rule, however.

➤ **Precision Instrument Runways**—The FAR Part 77 approach surface for precision instrument runways extends 50,000 feet (nearly 10 miles) from the runway primary surface. Considering that the height limit at this distance is 1,200 feet above the airport elevation, establishing an airport influence area of that size solely for the purposes of airspace protection is usually unnecessary. However, where rising terrain is a factor or where other types of approaches place aircraft at a low altitude several miles from the

An alternative to stretching the airport planning area boundary simply to encompass the outermost limits of the Part 77 airspace surfaces is to require that any proposed construction more than 200 feet in height be submitted to the ALUC for review regardless of where in the county the object would be located. Proposed construction of this height also must referred to the FAA for review in accordance with Part 77 regulations.

runway, extension of the airport influence area beyond the conical surface may be appropriate.

- **Major Flight Routes**—Major flight routes to and from busy airports, especially major airline airports and some military fields, can produce overflight impacts and sometimes even noise contours which extend beyond the FAR Part 77 boundaries. If corresponding compatibility policies are designated for these locations, the airport influence area boundary would be extended accordingly.

- **Limited-Use Airports**—At some airports, aircraft-related impacts are limited almost exclusively just to portions of the airport environs (because certain runways are seldom used, for example, or because the traffic pattern is situated only on one side of the runway). In these situations, the airport influence area can sometimes be reduced to less than the area encompassed by the FAR Part 77 surfaces. If this is done, however, steps need to be taken to assure that tall objects situated within the excluded area do would not constitute significant airspace obstruction concerns.

- **Military Airports**—Military airports have their own separate set of FAR Part 77 airspace surfaces. These surfaces cover a much more extensive area than for civil airports: a minimum of 30,000 feet from the runways in all directions plus 50,000 feet along the runway approaches.

- **Default Boundaries**—If an ALUC has not adopted an influence area boundary for a particular airport, then (in accordance with Section 21675.1(b)) the default "study area" includes all land within two miles of the airport *boundary* (not the runway). Some ALUCs may choose to maintain approximately this boundary when adopting a compatibility plan.

ALUCs should take two additional factors into account when defining airport influence area boundaries. One consideration is that all of the airport influence area should be subject to at least one type of compatibility policy even if it is only height limits. If there are no compatibility restrictions or other conditions applicable within a portion of the influence area, the boundary should be redrawn to reduce its size. The second point—one emphasized in Chapter 2—is that state law (Section 21675(c)) requires ALUCs to consult with affected local jurisdictions before adopting or modifying an airport influence area boundary.

Base Map Alternatives

An important step in the mapping of an airport's compatibility zones is selection of an appropriate base map. Common alternatives include:

- **Geographic Information System (GIS) Mapping**—These computer-based mapping and data systems are becoming increasingly common in county and city government. When used in planning departments, street systems, parcel lines, and other geographic elements usually form the base map and then a variety of information associated with each parcel is included in the database. GIS maps are typically geo-referenced, thus

assuring that at least major features—especially section corners—are geographically accurate. When a GIS has been established, addition of compatibility zones as another data layer or "theme" is highly advantageous. By so doing, the likelihood that compatibility criteria will be overlooked during local review of a development proposal is reduced.

- **Parcel Maps**—When GIS mapping is not available, a common alternative is a composite parcel map assembled from assessor's maps or other sources. Producing a reasonably accurate base map from smaller parcel maps can often be a challenge.
- **Land Use or Zoning Maps**—If sufficiently detailed, the same base maps as used for local land use or zoning purposes offer another alternative when a GIS has not been established.
- **Topographic Maps**—Topographic maps prepared by the U.S. Geological Service (USGS) are obtainable for all areas of California in both printed and digital form. Because these maps show ground elevations, they are particularly useful for airspace protection plan mapping. However, topographic maps do not show enough detail to facilitate finding particular locations within urban areas and they are generally outdated as well.

A note of caution regardless of the source of the base map: airport runways frequently are not shown, are not accurately located, or are not the correct length. Since most compatibility zones are typically tied to the runway position, not other geographic features, steps should be taken to assure that the runway is correctly depicted. A current airport layout plan indicating the geographic coordinates of the runway ends is an ideal source of runway location data. When GIS is used, this data can be directly entered into the system. Although normally not as precise, aerial photographs can also be used as a means of establishing the placement of a runway on a base map.

Accounting for Existing Development

The Aeronautics Act gives ALUCs authority to conduct compatibility planning for areas around public airports only "to the extent that these areas are not already devoted to incompatible uses." This phrase is generally accepted to mean that the commissions have no authority over existing development. In formulation of compatibility plan policies, several facets of this limitation are important to take into account.

Defining "Existing"

The first issue to be addressed regarding this topic is to define when during the development process a property becomes "devoted to" a certain use and thus constitutes "existing" development. The Aeronautics Act does not define either term. It is therefore necessary to turn to other statutes together with case law for guidance.

A development does not need to be completed in order to be considered devoted to the use. At a certain time during the development process, approvals become irrevocable and a use must be considered existing insofar as the ability of local governments or airport land use commissions to force changes to a project. In these circumstances, a project proponent is considered to have *vested rights* to proceed with the development. *Vested* means "the irrevocable right to complete construction notwithstanding an intervening change in the law that would otherwise preclude it" [*McCarthy v. California Tahoe Regional Planning Agency*, Cal.App3d 222, 230 (1982)].

For the purposes of this discussion, local government approvals can be divided into three categories:

- Actions which clearly give a developer vested rights;
- Actions which may provide vested rights depending upon the circumstances; and
- Actions which do not provide vested rights.

Development Rights Established

According to the California Supreme Court, the right to develop becomes vested when all *discretionary* approvals for a project have been obtained and only *ministerial* approvals remain. More specifically, vested rights have *not* been established *unless* the developer has:

- Obtained a valid building permit (as distinguished from merely a foundation or other specific permit); *and*
- Performed substantial work; *and*
- Incurred substantial liabilities in good faith reliance upon the permit.

[*AVCO Community Developers, Inc. v. South Coast Regional Commission*, 17 Cal.3d 785, 791 (1976)]

To give further certainty to the development process, the state legislature provided for vested rights to be established by means of two specific types of local actions. One is a *development agreement*. State statutes allow a county or city to enter into a binding agreement with a developer enabling a project to proceed in accordance with policies, rules, and regulations existing and any conditions established at the time of the agreement (Government Code, Section 65864 et seq.). "A development agreement shall specify the duration of the agreement, the permitted uses of the property, the density or intensity of use, the maximum height and size of proposed buildings, and provisions for reservation or dedication of land for public purposes" (Section 65865.2).

The second form of agreement between a developer and the local land use jurisdiction, which establishes vested development rights, is a *vesting tentative map* (Government Code, Section 66498.1 et seq.). Such agreements "confer a vested right to proceed with development in substantial compliance with the ordinances, policies, and standards in effect at the time the vesting tentative map is approved or conditionally approved" (Section 66498.1(b)). A related California Supreme Court decision noted that:

"Tentative map approval is the final discretionary approval issued by a local government under the Map Act; final map approval is merely ministerial if the application for such approval is in substantial compliance with the tentative map and its conditions" [*City of West Hollywood v. Beverly Towers, Inc*., 52 Cal.3d 1191].

Development Rights Uncertain

The principal local action falling into a middle ground of potentially establishing vested development rights is issuance of government permit other than a building permit—a *conditional use permit* being the primary example. Court decisions have concluded that such permits effectively provide vested rights only when they function much like a building permit. To qualify, the permit must afford "substantially the same specificity and definition to a project as a building permit" [AVCO, 793-794].

Development Rights Not Established

A wide variety of governmental permits and other actions have been determined by state appellate courts as being insufficient to form the basis of a vested right to proceed with a development. Some of the court decisions were based upon narrowly defined sets of circumstances. Nevertheless, while some caution should be exercised in applying this list more broadly, the following types of actions generally do not by themselves establish vested rights:

- Issuance of a tentative tract map (fees and other requirements can be imposed as conditions for subsequent issuance of a building permit);
- Recording of a final tract map;
- Issuance of a demolition permit and a foundation permit;
- Filing of an application for a building permit;
- Establishment of an assessment district;
- Extension and/or installation of infrastructure (e.g., roads and utilities); and
- Issuance of a business license.

Implications for ALUCs

The preceding discussion has several important implications for airport land use commissions.

Define "Existing Land Use"

ALUC policies should declare as clearly as possible the types of local government approvals which, in the ALUC's determination, establish a land use development as effectively existing even if actual construction has not taken place. Such development is not subject to ALUC review and also would not be considered for the purposes of the commission's review of county and city general plans. Developments for which vested rights, as described above, have been obtained must be considered to be existing land uses. Developments which have not become vested may nevertheless be treated as existing land uses, but there is no requirement that the ALUC do so. For

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Because ALUCs have some leeway in how they interpret what constitutes *existing land use*, it is important that a definition be included in the compatibility plan.

example, most ALUCs regard issuance of a valid building permit as giving a development the status of an existing land use even if construction has not yet begun. More broadly, ALUCs typically consider a vacant property as devoted to a particular use once all discretionary local government approvals have been issued and only ministerial approvals remain.

Also important to recognize, however, is that receipt of one of these approvals does not eliminate the obligations of a project proponent to comply with development regulations and conditions which other local and state agencies have established. Thus, while an ALUC cannot force a change in a land use once this approval status has been achieved, it can nevertheless require compliance with height restrictions, intensity limitations, noise level reduction, and other criteria set forth in its policies and implemented by local agencies.

Mapping of Existing Land Uses

A current high-altitude, aerial photograph of the airport environs is an excellent tool for this purpose. It shows the extent of development on a broad scale without providing largely unnecessary detail regarding the development status of individual small parcels.

Some ALUCs have taken the step of mapping the locations or parcels in the airport influence area where it considers the uses to be existing at the time of a compatibility plan's adoption. Alternatively, the ALUC can request an existing land use map to be submitted by affected local governments as part of the general plan consistency process.

Existing Residential Parcels

Reasonable limitations can nevertheless be set on the height of the structure. Also, where the size of the lot allows, location of the building on the least impacted portion can be encouraged.

As a practical matter, an ALUC cannot prevent construction of a dwelling on an existing residential parcel, even one located within a runway protection zone. Construction of a secondary dwelling on such parcels also typically cannot be prohibited where allowed by local zoning. (ALUCs should, however, take the potential for secondary dwelling units into account when assessing proposals for new residential development.) These points are worth stating in the compatibility plan policies.

General Plan Consistency

As discussed in Chapter 4, the locations of existing development needs to be taken into account when a general plan or specific plan is reviewed for consistency with an ALUC's compatibility plan. If a local plan merely reflects uses which already exist, the plan does not become inconsistent with the compatibility plan even if the indicated uses are not compatible with airport activities. While an ALUC may encourage the local jurisdiction to adopt more appropriate land use designations and to invite redevelopment, finding that a local plan is consistent with the ALUC plan cannot be made contingent upon the plan showing a different future land use. ALUCs should also be sensitive to the complications for existing property owners that can occur when the land use designations are changed and existing land uses become nonconforming. If it is unlikely that the existing incompatible uses will be changed, modifying the general plan designations is probably unwise.

OTHER COMPATIBILITY POLICY CONSIDERATIONS

While policies establishing criteria for development densities and intensities, height limits, and so forth are the core elements of a compatibility plan, policies addressing a variety of other issues also should be considered. Clear delineation of ALUC policies on these matters helps to minimize subsequent disputes regarding specific development proposals.

Policies for Special Situations

The following are situations which warrant special attention in determining the compatibility or incompatibility of a land use development.

Expansion, Conversion, or Redevelopment of Existing Uses

The limitation on ALUC authority over existing land uses applies only to the extent that the use remains constant. Merely because a land use exists on a property does not entitle the owner to expand the use, convert it to a different use, or otherwise redevelop the property if new or increased compatibility conflicts would result. To the extent that such land use changes require discretionary approval on the part of the county or city, they fall within the authority of the ALUC to review. Moreover, under these circumstances, it is not necessary for a proposal to involve a general plan amendment or zoning change for it to come within the ALUC's purview.

Infill Development

Another special situation which ALUCs should consider when formulating compatibility policies is how to deal with *infill* development. By definition, infill areas are locations where development does not already exist. The areas thus are subject to ALUC review authority. The chief issue with regard to infill occurs when the existing uses are, and new development would be, inconsistent with the ALUC's compatibility criteria. The question which ALUCs need to address is whether it is realistic to attempt to prevent technically incompatible development of a small area surrounded by similar existing development.

ALUCs are not obligated to allow infill development. Nevertheless, infill is a topic which should be discussed with local jurisdictions when compatibility plan policies are being drafted.

ALUCs clearly can determine nonconforming infill uses to be inconsistent with their adopted compatibility plan. However, local governments are particularly likely to disagree with such determinations and potentially to overrule them. From a broader community planning perspective, creating incompatibility with airport activities may be judged as less of a concern than causing incompatibility between adjacent land uses—for example, by placing commercial or industrial uses in the midst of a residential area.

In these circumstances, a pragmatic approach may be for ALUCs to allow infill in locations not highly critical to airport activities and require local plans to designate compatible uses in the most important areas closest to the runways. Criteria outlining the conditions which qualify a parcel for infill development should be established. These criteria should address such factors as:

- The portions of the airport influence area within which infill is to be permitted (infill within the runway protection zone might be prohibited, for example);
- The maximum size of a parcel or parcels on which infill is to be allowed;
- The extent to which the site must be bounded by similar uses (and not extend the perimeter of incompatible uses);
- The density and/or intensity of development allowed relative to that of the surrounding uses and the otherwise applicable compatibility criteria; and
- Other applicable development conditions (such as easement dedication requirements or special structural noise level attenuation criteria) which must be met.

As discussed in the next section, easement dedication and acoustical treatment of structures are particularly important factors with regard to infill and other conditionally compatible development.

Based upon these criteria, local plans should specifically define areas where infill is acceptable. To avoid incremental extension of incompatible uses resulting from infill of some parcels allowing additional parcels subsequently to qualify as infill, the determination of infill locations should be done just once. This determination should be made either during the compatibility plan review and adoption process or in conjunction with subsequent amendment of general plans for consistency with the compatibility plan.

Reconstruction

Reconstruction of existing nonconforming land uses destroyed by fire or other calamity can be treated in a manner similar to infill development. That is, areas where it is acceptable should be defined and appropriate conditions should be set. The conditions—such as limitations on the extent of destruction which can be rebuilt or time within which reconstruction must occur—could be based upon those followed by local jurisdictions in their own plans and zoning. Policies also should indicate whether a reconstructed building must be limited to the same size and usage intensity as the original or can be slightly greater. Lastly, different policies on reconstruction may be appropriate for residential versus nonresidential land uses.

Conditional Compatibility

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Requirements for avigation easement dedication and acoustical treatment of structures often go hand in hand. If special acoustical treatment is warranted, an avigation easement should also be dedicated. Similarly, if noise impacts are a primary reason for requiring avigation easement dedication, then an acoustical analysis to determine the need for special construction measures should be required.

Under certain circumstances—such as with infill development as discussed above—ALUCs may be faced with a need to consider finding otherwise incompatible development to be acceptable. If a commission should decide to approve a proposal of this type, conditions should be attached to the approval which will, as much as is reasonably possible, mitigate the incompatibility. Two important requirements which ALUCs can set as conditions for development approval in these circumstances are avigation easement dedication and acoustical treatment of structures.

Avigation Easement Dedication

As with any type of easement on real property, *avigation easements* convey certain enumerated property rights from the property owner to the holder

of the easement. In this case, the easement holder is usually the airport owner. Easements continue in place as the underlying property is bought and sold (they "run with the land"). Moreover, their existence is documented during the title search conducted at the time of a property transfer. As commonly applied in the aviation industry, avigation easements convey the set of property rights listed in the adjacent sidebar. Easements which establish only the first two of these rights, but do not restrict the height of objects, are often referred to as *overflight easements*.

Standard Avigation Easement Provisions

- A right-of-way for free and unobstructed passage of aircraft through the airspace over the property at any altitude above an imaginary surface specified in the easement (usually set in accordance with FAR Part 77 criteria).
- A right to subject the property to noise, vibration, fumes, dust, and fuel particle emissions associated with normal airport activity.
- A right to prohibit the erection or growth of any structure, tree, or other object that would enter the acquired airspace.
- A right-of-entry onto the property, with appropriate advance notice, for the purpose of removing, marking or lighting any structure or other object that enters the acquired airspace.
- A right to prohibit electrical interference, glare, misleading lights, visual impairments, and other hazards to aircraft flight from being created on the property.

A sample of a typical avigation easement is included in Appendix D.

Historically, many airports have acquired avigation easements—often by purchasing them—on property where noise impacts are substantial or where limitations on the height of structures and trees is essential to protection of runway approaches. Airports also have obtained easements as a condition for airport-financed installation of noise insulation in structures. These continue to be highly appropriate functions for avigation easements.

Many airport land use commissions have taken the concept a step further by requiring property owners to dedicate an avigation or overflight easement as a condition for obtaining ALUC approval for proposed development. In locations, where high noise levels and/or the need for significant restrictions on the height of objects are present, avigation easement dedication requirements are generally warranted and desirable. However, ALUCs should exercise caution in adopting policies which make dedication of an avigation or overflight easement a condition for development approval in less impacted portions of the airport influence area. In locations where easements would serve primarily as a buyer awareness tool, other mechanisms, as discussed below, are usually more suitable.

No precise standards are available by which ALUCs can decide where avigation easement dedication is or is not appropriate. Nevertheless, useful guidance can be found in both statutory and case law.

California Airport Noise Regulations (California Code of Regulations, Section 5000 et seq.), for example, explicitly support avigation easements as an important land use compatibility tool, albeit under a narrowly defined set of circumstances. Specifically, the regulations deem new development of residential and certain other land uses within the 65 dB CNEL contour of a *noise problem* airport to be incompatible unless the airport obtains an avigation easement for aircraft noise. Within this noise environment, an increase in incompatible uses without attached avigation easements would be contrary to two of the fundamental purposes of ALUCs, those being "to promote the overall goals and objectives of the California airport noise standards…and to prevent the creation of new noise and safety problems" (Public Utilities Code, Section 21670(a)(1)).

Although the state regulations explicitly apply only to those few airports deemed to have a noise problem under the regulatory definition of the term, a similar approach is appropriate for ALUCs to adopt in their own policies. That is, wherever ALUC policies indicate that residential land uses

are normally incompatible—whether the standard is CNEL 65 dB or a lower level—approval for such development should reasonably be conditioned upon the developer's dedication of an avigation easement to the airport.

Another way to view the issue is to consider the circumstances under which the flight of an aircraft over private property—together with the noise and other impacts generated by that overflight—could be deemed a trespass on the land. If a trespass would take place, then an avigation easement should be obtained. Federal law on the limits of air navigation is not clearly delineated, however. U.S. codes simply define *navigable airspace* as the airspace above the minimum altitudes of flight prescribed by federal regulations, including airspace needed to ensure safety in the takeoff and landing of aircraft (Title 49, Section 40102). The best, although not very precise, summary of when an aircraft overflight would be a trespass is outlined in the *Restatement of Torts*, a document heavily relied upon by lawyers and judges as a synopsis of law. Section 159(2) reads:

> "Flight by aircraft in the airspace above land of another is trespass if, but only if, (a) it enters into the immediate reaches of the airspace next to the land, and (b) it interferes substantially with the other's use and enjoyment of his land."

Requirements for avigation easement dedication which go beyond these conditions risk being deemed inverse condemnation—a violation of the U.S. Constitution's prohibition on taking of private property for public use without just compensation. See the extended discussion on inverse condemnation later in this chapter.

Applying these rules, a requirement for dedication of an avigation easements may be reasonable where any of the following conditions exist:

- Aircraft are expected to be relatively low to the ground (such as where they are below traffic pattern altitude); or
- Zoning does not adequately restrict the heights of objects in the airport's environs; or
- Aircraft noise exceeds the level established as being of local significance.

Beyond these issues, two practical matters regarding avigation easement dedication need to be recognized. First is the fundamental fact that *avigation easements do not change the noise environment*. They are legal instruments which document that a property is subject to aircraft noise, as well as other impacts. Consequently, ALUCs should not use avigation easement dedication as a principal factor in determining whether a proposed land use is compatible with airport activity. Unless no feasible alternatives exist, noise-sensitive land uses should be prohibited in high-noise locations regardless of whether an easement is dedicated.

A second practical consideration is one which arises in more limited circumstances concerning privately owned and military airports. For private airports, the normal arrangement in which the airport owner is the holder of the easement means that a government entity is requiring a transfer of property rights from one private party to another. Even for privately owned airports which are public-use facilities, the legitimacy of this outcome is open to question. For military airports, the problem is more explicit: federal law prohibits federal acceptance of dedicated avigation easements. In both of these circumstances, an alternative which may be feasible is for the county or city in which the airport is situated to be the easement holder.

Acoustical Treatment of Structures

Another requirement which ALUCs should establish as a condition for development in special circumstances is acoustical treatment of structures. State law requires that "interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room" (California Building Code, Section 1208A). The code applies this standard only to new hotels, motels, dormitories, apartment houses, and dwellings other than single-family residential. However, many local jurisdictions—usually as a policy in the noise element of their general plan—have extended the requirement to single-family residences. ALUCs should do likewise.

See Chapter 7 for a more detailed discussion of this topic.

The code indicates that an acoustical analysis is necessary anywhere the annual CNEL exceeds 60 dB. However, given the normal noise level reduction provided by present-day construction standards, special measures are usually not necessary unless the noise level exceeds 65 dB CNEL.

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Any time an ALUC requires special acoustical treatment of a structure as a condition for development approval, dedication of an avigation easement should also be required.

Buyer Awareness Measures

As indicated in the discussion of compatibility strategies at the beginning of this chapter, some aspects of airport land use compatibility go beyond direct restrictions on the manner in which airport area property is developed and used. Particularly with respect to aircraft overflight annoyance concerns, compatibility between airports and surrounding land uses also can be improved through actions intended to enhance the public's knowledge and understanding of airport impacts. These actions focus on informing prospective buyers of property within an airport vicinity about the airport's impact on the property. Collectively, they are referred to as *buyer awareness measures*.

Although variations are sometimes created, measures designed specifically for the purpose of promoting buyer awareness fit mostly into two categories:

- Recorded deed notices; and
- Real estate disclosure statements.

A third device which serves a buyer awareness function is the avigation easement. Although not appropriate strictly as a form of buyer awareness measure, avigation easements are, as discussed above, valuable tools for airport land use compatibility planning in highly impacted portions of the airport environs.

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ALUCs are encouraged to adopt policies regarding the use of recorded deed notices and real estate disclosure statements where appropriate within the influence area of each airport in the commissions' jurisdiction.

Recorded Deed Notices

A deed notice is an official statement which is recorded in county records as part of a tentative or final subdivision map prepared at the time a parcel is subdivided. As a form of buyer awareness measure, recorded deed notices have broad applicability within an airport influence area. They can be used to disclose that the property is subject to routine overflights and associated noise and other impacts by aircraft operating at a nearby airport. Because this information becomes part of the deed to each property in the subdivision, it should show up in a title report prepared when one of the parcels is being sold.

An example of a deed notice is included in Appendix D.

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ALUCs should require recording of deed notices describing airport impacts as a condition for development approval anywhere in the airport influence area where avigation easements are not obtained.

A potential shortcoming of deed notices as a buyer awareness measure is that some county recorders reportedly will not record them because they do not affect title to the land. In such cases, the information would be given to the initial purchaser of a new development, but may not be passed along to subsequent buyers (by comparison, avigation easements can always be recorded). According to the state Department of Real Estate, this problem can be overcome if the county board of supervisor adopts an ordinance indicating that such notices should be recorded.

In one sense, deed notices are similar to avigation easements in that they become part of the title to a property and thus are a permanent form of buyer awareness. The distinguishing difference between deed notices and avigation easements is that deed notices only serve as a disclosure of potential overflights (and the fact that the property is located within an airport influence area), whereas avigation easements convey an identified set of property rights. In locations where height limitations or other land use restrictions are unnecessary, deed notices have the advantage of being less cumbersome to define and establish. Also, they give less appearance of having a negative effect on the value of the property. An ideal application of deed notices is as a condition of approval for development of residential land uses in airport-vicinity locations where neither noise nor safety are major concerns, but frequent aircraft overflights might be annoying to some people.

Real Estate Disclosure Statements

As discussed in Chapter 5, airport proprietors also can carry out a real estate disclosure program on their own.

Another important form of buyer awareness measures represented in ALUC policies are real estate disclosure statements. California state real estate law requires that sellers of real property disclose "any fact materially affecting the value and desirability of the property" (California Civil Code, Section 1102.1(a)). While this general requirement leaves to the property seller the decision as to whether airport-related information constitutes a fact warranting disclosure, other sections of state disclosure law specifically mention airports.

Section 1102.17 of the Civil Code says that: "The seller of residential real property subject to this article who has actual knowledge that the property is affected by or zoned to allow industrial use described in Section 731a of the Code of Civil Procedure shall give written notice of that knowledge as soon as practicable before transfer of title."

Section 731a of the Code of Civil Procedure then specifies: "Whenever any city, city and county, or county shall have established zones or districts under authority of law wherein certain manufacturing or commercial or *airport* uses are expressly permitted, except in an action to abate a public nuisance brought in the name of the people of the State of California, no person or persons, firm or corporation shall be enjoined or restrained by the injunctive process from reasonable and necessary operation in any such industrial or commercial zone or *airport* of any use expressly permitted therein, nor shall such use be deemed a nuisance without evidence of the employment of unnecessary and injurious methods of operation…." [*emphasis added*]

The interpretation of the Department of Transportation Legal Division is that these sections of the law establish a requirement for disclosure of information regarding the effects of airports on nearby property provided that the seller has "actual knowledge" of such effects. ALUCs have particular expertise in defining where airports have effects on surrounding lands. ALUCs thus can give authority to this disclosure requirement by establishing a policy indicating the geographic boundaries of the lands deemed to be affected by airport activity. In most cases, this boundary will coincide with com-

mission's planning boundary for an airport (the airport area of influence). Furthermore, ALUCs should disseminate information regarding their disclosure policy and its significance by formally mailing copies to local real estate brokers and title companies. Having received this information, the brokers would be obligated to tell sellers that the facts should be disclosed to prospective buyers.

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ALUCs are encouraged to adopt policies defining the area within which information regarding airport noise impacts should be disclosed as part of real estate transactions.

The sole purpose for ALUC adoption of a policy such as this is to help to ensure that information regarding airport impacts will be disclosed as a normal part of real estate transactions. ALUCs have no authority to mandate disclosure of airport-related information, let alone to monitor whether such disclosures occur. To this extent, any ALUC policies regarding disclosure are merely advisory. This status applies not only to individual sellers of real property, but to local land use jurisdictions. ALUCs can encourage counties and cities to adopt similar policies, but cannot require them to do so. These jurisdictions do not need to include an airport-related real estate disclosure policy in their general plans for those plans to be considered consistent with an ALUC compatibility plan which contains a disclosure policy.

Although achievement of buyer awareness objectives are less certain with real estate disclosure policies than with avigation easement dedication or recorded deed notices, an advantage of disclosure is that it is more all-encompassing. Real estate disclosure policies are the only form of buyer awareness measure available to ALUCs which apply to previously existing land uses as well as to new development.

LIMITS ON LAND USE RESTRICTIONS

While having an airport environs be totally devoid of development may be ideal from a land use compatibility perspective, it seldom is a realistic objective. For one, existing development already makes such sterility impossible to achieve at most airports. Moreover, even in sparsely populated areas, tradeoffs generally must be made between an ideal degree of land use compatibility and the community needs for land use development. This section explores some of the legal and practical limitations on the restrictiveness of land use compatibility measures.

Inverse Condemnation

The material presented in this section is written from a professional planning perspective. It is not a legal opinion.

A concern sometimes raised (especially by landowners) with regard to establishment of airport land use restrictions is that the restrictions might constitute inverse condemnation—a *taking* of private property without just compensation. This is not a new concern. The criteria for compensable takings have long been debated in legal literature. Also, many court cases, including some specifically dealing with airports, have delineated when a taking has or has not occurred. Even as far back as 1952, the report of the President's Airport Commission, *The Airport and Its Neighbors* (the Doolittle Commission report, discussed more fully in Chapter 8), devoted several pages to the topic.

Inverse condemnation is a highly complex subject. It is not possible for this *Handbook* to delve into it at length—entire books can and have been written on the topic. Rather, this section is merely a brief summary of the issue as it applies to airport land use compatibility planning. The emphasis is on the implications for ALUCs.

State law does not give ALUCs direct authority over land use. Implementation of an ALUC's policies is accomplished by the county and affected cities through the process of making their general plans, specific plans, and applicable ordinances consistent with the ALUC's compatibility plan. Therefore, a legitimate question is whether it is possible for an ALUC policy to result in a taking through inverse condemnation. Without doubt, a property owner who feels aggrieved might sue the ALUC along with other local entities. What the outcome of any such lawsuit might be is uncertain. One view is that, because an ALUC has no assets or taxing powers of its own, either the airport owner or the local agency which implements the compatibility policies is more likely than the ALUC to bear the brunt of any such lawsuit. Regardless of whether this assessment is valid, the question of which local agency could more readily be successfully sued is not directly of interest. The issue here concerns the limitations which the potential for inverse condemnation presents in implementation of airport land use compatibility measures. Therefore, more to the point is the issue of what forms and degrees of land use restrictions for airport compatibility purposes are legally sound.

Legal Basis for Regulation

The legal basis for local government regulation of land use is well defined by both statutory and case law. Generally, such regulations are founded upon the basic power of the state to enact legislation protecting the public health, safety, morals, and general welfare of its citizens. This authority is typically passed along to municipalities by state enabling legislation. The principal form of land use regulation in most municipalities is zoning. The constitutionality of zoning was upheld in a landmark case decided by the U.S. Supreme Court in 1926 [*Village of Euclid v. Ambler Realty Company*].

In California, the ability of local governments to regulate land use is an exercise of the police power granted by Article XI of the California Constitution. The authority for airport land use commissions to establish land use regulations is provided by Section 21675(a) of the Public Utilities Code. This section states that "in formulating a land use plan, the commission may develop height restrictions on buildings, specify use of land, and determine building standards, including soundproofing…" (An earlier reference for ALUCs "to achieve by zoning" the purposes of the statutes was deleted from the law in 1982.)

Limits to Land Use Regulation

The fundamental limitation on governments' power to take property is set forth by the Fifth Amendment to the United States Constitution which states: "…nor shall private property be taken for public use, without just compensation." The most direct application of this principle requires the govern-

ment to pay fair value for property which it condemns for public use by means of *eminent domain* proceedings. It is not necessary, how ever, for government to dispossess the owner or physically occupy the property in order to have effectively created a taking. A taking can also result through overly restrictive land use regulations.

The legal interpretation of when a government regulation of land use becomes a taking has continually been refined—and, occasionally, modified—as the courts have heard new cases. Although the basic principles have been in effect for some time, their application to a specific set of circumstances is often not a simple task. Even the U.S. Supreme Court has admitted that it has never been able to develop a "'set formula' to determine when 'justice and fairness' require that economic injuries caused by public action be compensated by the government…" [*Penn Central Transportation Co. v. New York City*, 438 U.S. 104, 124 (1978)].

A succinct statement of the basic principles is found in the U.S. Supreme Court's opinion in *Agins v. City of Tiburon* [447 U.S. 255 (1980)]. In that case, the court declared that for a land use regulation to avoid constituting a taking, it must pass two tests:

- It must "substantially advance legitimate state interests" and
- It must not deny the property owner of "all economically viable use of his land."

The following two sections elaborate upon these criteria.

Defining Legitimate Government Purposes

The terms "substantially advance" and "legitimate state interests" as used in the first of these two tests have never been precisely defined by the courts. Over the years, though, many court cases have shed light on the nuances of their meaning. Mostly this has occurred through various rulings regarding the legitimacy of specific regulations which have been challenged.

It is generally easier for courts to find a legitimate public purpose when a land use regulation "prevents a harm" rather than "confers a benefit." One case noted that the purpose of a regulation must be taken into account: "the nature of the State's interest in the regulation is a critical factor in determining whether a taking has occurred…" [*Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393 (1922)]. An important, more recent, case on this subject [*Nollan v. California Coastal Commission*, 483 U.S. 825 (1987)] placed focus on the concept that there must be a *nexus* or connection between the public policy being invoked by the regulatory agency and the conditions or restrictions placed on that development to implement the policy. Such restrictions must clearly and directly serve to mitigate the burden. In later case [*Dolan v. City of Tigard*, 512 U.S. 374 (1994)], the court went on to require that such conditions be "roughly proportional" to the burden on the community created by the proposed private development.

Regulation of land around airports to assure compatibility with the airport is widely held to be a legitimate public purpose. The purpose of all land use

regulations, after all, is the reduction of incompatibilities among different types of land uses. The state enabling legislation for airport land use commissions clearly defines the purpose of the statute as being "to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports…"

There is, however, a body of legal opinion which suggests that, at some point, measures to protect airports from incompatible land uses become a transfer of rights from one private party to other private parties. That is, owners of land adjacent to an airport give up certain rights (for example, the ability to build structures which would penetrate FAR Part 77 surfaces) which are then given to the users of the airport. In this legal view, no legitimate public purpose is being served and the action is not a valid exercise of the police power. Compensation would be necessary for any such taking unless the property owner has waived this right by failing to take timely action (in California, within five years of the event).

The nexus issue is another takings-related concern that has sometimes arisen in the context of airport land use planning. In instances where proposed land uses are marginally incompatible with airport activities, it is the policy of many ALUCs to require the land owner to dedicate an avigation easement to the airport as a condition for finding the proposed development consistent with the commission's compatibility plan. The issue raised is whether there is sufficient nexus between the negative effect of the development on the community (specifically, the community's airport) and the condition imposed on the development. To establish this connection, the development must be shown to have the potential for causing harm to the community and the imposed condition must mitigate that harm.

The issue of legal soundness notwithstanding, the most appropriate application of avigation easement dedication is with respect to property where noise impacts and height limitations are significant factors. This topic is discussed in an earlier section of this chapter.

For example, because the developer is asking the land use regulator to permit a basically incompatible land use to be put in place, a good case can be made for the required avigation easement dedication in situations involving rezoning of land from an agricultural or other airport-compatible use to an incompatible use such as a residential subdivision. Such a change would have the negative effect on the community of creating a new constraint on the use of the airport—a public facility—and thus would likely constitute a sufficient nexus to warrant imposing the avigation easement as a development condition. On the other hand, the appropriateness of adding an avigation easement dedication condition to land already zoned residential might be difficult to demonstrate unless the ALUC had previously established this requirement as a condition for finding the general plan consistent with the commission's plan.

Determining Reasonable Use of Land

By their very nature, government regulations have direct or indirect effects on property values. In examining whether a taking has occurred in a particular instance, the courts sometimes consider the extent of the resulting change in value of the property. However, when following this approach,

the courts look to the value remaining in the property, *not* the value that might have resulted had the land been permitted a higher use. Local land use regulations that have resulted in more than a 90% reduction in the value of an individual's land have been upheld as not a taking because sufficient "economically viable" use of the land still remained. Generally though, the greater the range of remaining permitted uses, the easier it is for government to avoid a successful inverse condemnation suit.

Local governments are largely free to change land use designations and zoning at their discretion. Landowners are not entitled to reimbursement for hypothetical losses due to changes in zoning, nor do they have any right to anticipate a change in zoning. Zoning decisions are generally held to be legislative acts and courts will not substitute their judgment for those of elected officials. However, as described earlier in this chapter with respect to defining existing land uses, a point is reached in the development process when the developer has secured *vested rights* to proceed with the project.

In applying these principles to the work of airport land use commissions, a couple of points are noteworthy. One point, previously mentioned in Chapter 1, is that ALUCs can (to paraphrase the Supreme Court in *Penn-Central*) only go so far in restricting land uses for airport compatibility purposes. In locations close to the ends of runways, extreme noise levels, high accident potential, and significant limitations on the height of objects may restrict the choice of land uses to a few types of open space or agricultural functions. None of these land uses may be economically viable in urban areas. In these instances, acquisition of the property may be the only appropriate choice. This is an action which only the airport owner can take—ALUCs do not have this authority to acquire land or to require that the airport do so.

The vested rights issue is pertinent to ALUCs in that it helps to define when a proposed land use becomes existing and thus no longer subject to the commission's review. It is important, therefore, that ALUCs have the opportunity to review land use proposals at an early stage—preferably as a general plan or specific plan action—before they become vested. In some situations, financial commitments or other factors can result in vesting occurring quite early in the development process.

Remedies for Excessive Land Use Regulation

As long interpreted by California courts, the principal remedy in situations where an excessive land use regulation was found to constitute a taking had been for the court to invalidate the regulation. However, a 1987 U.S. Supreme Court decision [*First English Evangelical Lutheran Church of Glendale v. County of Los Angeles*, 482 U.S. 304, 107 S. Ct. 2378 (1987)] overturned the California rule. In this case, the Court held that the U.S. Constitution also requires that the landowner be compensated for a "temporary taking" which occurred while the regulation was in effect. A simple invalidation of the regulation would not be a sufficient remedy for the resulting damages incurred by the landowner.

A separate issue—one that is beyond the scope of the discussion here—is how the amount of monetary damages is to be calculated. The current status might nevertheless be summarized by saying that, much like with the overall issue of determining when a regulatory taking has occurred, the courts have adhered to a case-by-case approach when reviewing the factors affecting the calculation of appropriate damages. Future court decisions will undoubtedly continue to refine how various factors are to be included in the equation.

Practical Considerations

The sole responsibility of ALUCs is to prevent incompatible land use development and thereby both protect the public from noise and risks and preserve the utility of airports. In carrying out this responsibility, ALUCs should be guided by objective analyses of airport land use compatibility concerns.

This focus notwithstanding, ALUCs also need to be practical in their actions. Although ALUCs should not be driven by political, economic, or other non-compatibility-related factors, they should at least be cognizant of them. They should be aware of the effects that their plans and compatibility determinations will have on local land use jurisdictions and the possible reactions which these jurisdictions may have to these matters. When making land use decisions, counties and cities have other issues to contend with besides airport compatibility. Although overruling an ALUC decision requires special steps, local jurisdictions sometimes will make this effort if they feel it is in their community's best interest to do so. Many overrulings do not meet the requirements of the law. Others, however, may be legitimate, particularly if ALUCs have not established a solid foundation for their decisions.

The bottom line is that the most desirable outcome of the airport land use compatibility planning process is for counties and cities to support and take the necessary measures to implement the compatibility policies adopted by ALUCs. If ALUCs can maintain the integrity of the compatibility planning objectives set forth in the Aeronautics Act while still accommodating the needs of local jurisdictions, then they should give careful consideration to any such alternatives.

Compatibility Planning for Specific Airport Types

The State Aeronautics Act requires—or, in the case of military airfields, allows—compatibility plans for various types of airports. While each airport presents a distinct combination of characteristics, both operationally and in terms of surrounding land uses, even broader differences are apparent among the various airport categories. The relative extensiveness of noise versus safety concerns varies between a typical air carrier airport and a typical general aviation facility, for example. The availability of data from which to develop a compatibility plan also tends to differ from one airport type to another. The discussion in this section focuses on the dis-

tinctive compatibility planning concerns and approaches common to each category:

- Air carrier airports;
- General aviation airports;
- Converted military airports;
- Military airports; and
- Heliports.

Air Carrier Airports

Several factors distinguish compatibility planning for air carrier airports from that for most other facilities. Some of these factors pertain to the substance of the compatibility policies; others involve the resources available for preparation of a compatibility plan.

From a land use compatibility standpoint, noise is usually the dominant concern. The 65-dB CNEL contour for a major air carrier airport can extend far beyond the runway ends. Lower-noise-level impacts can encompass several square miles of the airport environs.

As a practical matter, though, the ability of airport land use commissions to address compatibility matters around air carrier airports is often limited. Most air carrier airports in California are situated in existing, highly urbanized communities. Except for infill or redevelopment, there are few opportunities for new development and thus few proposed land use actions for the ALUCs to review. Where new development is allowed, noise insulation programs and the requirement for avigation easements are a major component of land use compatibility policies both for the airport land use commission and the airport itself.

The second distinct factor about compatibility planning for air carrier airports is that data and other resources needed for plan preparation are typically more readily available than for other airports. To start with, these facilities typically have full-time staff specifically assigned to dealing with noise, land use compatibility, and other issues affecting the surrounding communities. Recent calculations of current noise contours and up-to-date projections of future activity levels and noise impacts are commonly available. Moreover, noise monitoring and radar flight track data may be available to increase the precision of both current and projected noise contours. For planning purposes, however, the predictions for the noise environment in the distant future (20+ years) are more important than the measurements of noise in the past.

General Aviation Airports

The characteristics of general aviation airports and their environs vary widely. They range from very busy "reliever" airports in metropolitan areas to minimally used facilities in rural locations. The extent of compatibility issues and the availability of data from which to create a compatibility plan also run the full gamut.

For an average general aviation airport, noise, safety, airspace protection, and overflight compatibility concerns are all important issues to be addressed in compatibility plans. Moreover, because many general aviation airports are located on the fringes of urban areas, both the threat of new incompatible development and the opportunity for ALUCs to help preserve a compatible airport land use relationship are great.

See Chapters 6 and 7 for discussion of noise data sources and compatibility criteria. Chapters 8 and 9 contain valuable data with which to address safety-related issues.

Available activity level, noise impact, and other data needed for compatibility planning is not normally as extensive as for air carrier airports. Essential information often must be gathered from a variety of sources ranging from airport master plans to interviews with airport staff and others familiar with operation of the airport. Obtaining data on the locations of principal flight routes can be particularly difficult, yet of key importance at moderately busy facilities. Again, planning for the distant future is highly important.

Converted Military Airports

A series of federal Base Realignment and Closure (BRAC) Acts since the 1980s has led to closure of numerous military bases across the country. In California, many of the closed bases have included airfields which have subsequently been or yet could be converted to civilian use. Most of these airports are major facilities with long runways capable of accommodating almost any type of aircraft. Because of the wide range of future operational scenarios possible for converted military airports and their lack of history as civilian facilities, preparation of compatibility plans for them can be particularly challenging. In this regard, there are two key issues which ALUCs need to address.

Timing of ALUC Involvement in Conversion Process

Typical Base Conversion Process

1. Department of Defense begins preparation of a Final Disposal Plan.
2. Local Reuse Authority (LRA) created with responsibility for planning reuse of all surplus base property. The LRA may or may not become the airport sponsor (owner or operator).
3. LRA applies for funds from Department of Defense/Office of Economic Adjustment to prepare a base reuse plan.
4. Application is made by LRA for Airport Improvement Grant (AIP) funds to prepare an airport master plan for the new civilian airport. (This is not a required step, but is a useful one. As an initial step, grant funds sometimes are sought to prepare a feasibility plan to determine if a civilian airport is needed and would be financially viable. If a formal master plan is not prepared, the general

Conversion of a military base to civilian use entails a lengthy series of steps. In practice, the process entails four distinct sub-processes:

- The military's property disposal process;
- The community reuse planning process;
- The environmental review process; and
- The environmental clean-up process.

These processes are not sequential. Rather, there are many overlaps and interconnections among them. The individual processes may be delayed, halted, and then started again and they do not necessarily span the same period of time.

After the decision to close a military base has been made, other federal agencies have first option to obtain all or part of the property. Any property deemed surplus to federal needs is made available to local government entities and certain community organizations in accordance with the community's reuse plan. Major steps in the reuse and environmental review processes are summarized in the adjacent sidebar.

ALUCs can get involved in the conversion process at any time. The State Aeronautics Act does not specifically mention military base conversions or when ALUCs should become involved. The only statutory requirement for

ALUC involvement stems from the commissions' responsibility to review proposed airport construction plans prior to their adoption by the local reuse authority or a successor entity chosen to operate the airport (as required by the PUC Section 21661.5). Most often, this step does not occur until relatively late in the conversion process, after many key decisions have been made. Given these circumstances, it is usually wise for an ALUC to become involved at the very beginning, albeit at a very modest level initially. A graduated approach is recommended.

Conversion of military bases typically involves allocation of land and facilities among many competing uses. Early in the conversion process, ALUCs should make sure that decision-makers are aware that enough land needs to be retained to afford maximum compatibility with the eventual civilian aviation use. Initially, it should be sufficient to note that, while the areas beyond the runway ends are the most sensitive, all areas which will be routinely overflown have potential compatibility concerns. These compatibility concerns will likely involve land both on the base and in its environs. The next point at which an ALUC can be of service is during the development and analysis of alternative uses. ALUCs should seek to ensure that every alternative involving an aviation use includes appropriate compatibility measures. Existing ALUC policies can be used to formulate preliminary compatibility zone boundaries for each alternative.

Once a preferred alternative is selected, the ALUC needs to be satisfied that the environmental documents (under CEQA and NEPA) include consideration of the full range of compatibility concerns. Limiting consideration to noise contours associated with future civilian aviation uses is not sufficient. Safety and overflight impacts must also be considered. This is also the time to make certain that off-base land use designations support the civilian airport use. There may be pressures to permit residential uses (as well as schools, etc.) closer to the civilian airport than was permitted when used by the military.

description of the role and activity levels contained in the reuse plan will provide basic guidance on future use of the new civilian airport.)

5. LRA receives a grant and begins preparation of a base reuse plan. The plan will define, at least in general terms, how all of the surplus base property—including both aviation and/or nonaviation components—will be used.
6. If an airport master plan is funded, preparation begins.
7. Community reuse plan (possibly including an airport master plan) is completed.
8. Environmental impact statement (EIS) and environmental impact report (EIR) are prepared under the requirements of the National Environmental Policy Act and California Environmental Quality Act, respectively. The community reuse plan is typically the "preferred alternative" in these environmental documents.
9. Department of Defense issues Notice of Determination on EIS and adopts Final Disposal Plan.
10. LRA adopts reuse plan, airport master plan (if prepared), and associated EIR.

Assumptions Regarding Future Airport Configuration and Use

A base reuse plan and/or airport master plan together with their associated environmental documents will typically contain most of the elements necessary to prepare a compatibility plan:

- A physical plan for the airfield showing the location and dimensions of runways and types of instrument approaches, both current and future;
- A description of the future roles of the airport including the mix of aircraft types;
- Forecasts of aircraft activity; and
- Noise contours associated with the forecast level of activity.

A potential shortcoming of these plans is that the forecasts may not extend far enough into the future to adequately serve the purposes of airport land use compatibility planning. As discussed in Chapter 2, noise impacts associated with an airport-capacity level of activity may warrant evaluation.

Inherently, the base conversion process requires greater speculation about future civilian aviation uses than would a master plan for an existing civilian airport. First, there is typically no history of civilian aeronautical use or only very specialized civilian use. Secondly, there is commonly an explicit marketing or promotional aspect to conversion plans. The first factor in

creases the uncertainty, while the second tends to inflate the magnitude and scope of future activities.

Since land uses tend to endure for long periods of time, it is appropriate for aviation forecasts to anticipate activity levels at the high end of the range of plausible levels. Forecasts that are somewhat high will help preserve an envelope within which future aviation activities can take place in harmony with nearby land uses.

ALUCs are not empowered to determine what the future airfield configuration, airport role, or activity levels will be. State statutes direct that a compatibility plan must be based upon an airport master plan. A base reuse plan can be expected to contain the elements of an airport master plan. However, if an ALUC is presented with a reuse plan that is so visionary that the anticipated civilian aviation use strains the bounds of credibility, it is faced with a dilemma.

State law anticipates that ALUCs will devise compatibility plans to support the future aviation uses selected by the airports' owners. If an airport's owner has selected a future airfield configuration, role, or activity level that an ALUC considers unrealistic or inappropriate, the ALUC has few options. The most that ALUCs can do is negotiate with the airport owner in an effort to have the airport plan modified to be more realistic or appropriate. Ultimately, state law forces ALUCs to accept plans adopted by airport owners, even if the ALUC considers the plans unrealistically grandiose or too modest.

Military Airports

Adoption of compatibility plans for military airports is optional under the State Aeronautics Act (PUC Section 21675(b)). Nevertheless, many ALUCs have included these facilities in their plans. Several factors make compatibility planning for military facilities distinct from that for civilian airports.

Most of the remaining military airports in California are part of large bases covering extensive land areas. Even the bases located near urban areas tend to have substantial amounts of open land near the runways. These buffer areas are valuable in terms of land use compatibility, especially with regard to safety. The noise impacts of military airports, however, can still extend far beyond the base boundaries due in large part to high noise levels generated by many military aircraft.

A particularly unique aspect of compatibility planning for military airports is that aircraft activity forecasts of the sort done for civilian airports are not very meaningful. Military airport activity levels depend almost exclusively on the mission of the base and on national or international events involving military participation. A typical planning approach thus is to postulate a "maximum mission" for the base. ALUCs wishing to anticipate the potential for yet greater aircraft operations impacts sometimes base their planning on a multiple of the maximum mission activity levels (a multiplier of 1.5 or 2, for example).

The best source of data from which ALUCs can develop a compatibility plan for a military airport normally is the *Air Installation Compatible Use Zone* (AICUZ) study which the Department of Defense requires for each base. AICUZ studies contain analyses of noise, accident potential, and height restrictions impacts of aircraft operations. For each of these impacts, a set of land use compatibility criteria are indicated. These criteria are merely recommendations to local land use jurisdictions—other than through acquisition of property, the military has no powers to enforce them. AICUZ compatibility criteria tend to be minimal in terms of the degree of protection from incompatible land uses which they afford. ALUCs and local jurisdictions can and should consider setting higher standards in their own respective compatibility planning. Ensuring a high degree of land use compatibility around military airports is particularly prudent given the economic importance which major bases have to the surrounding communities and the fact that land use compatibility is one of the factors considered in the government's assessment of which bases to maintain in operation.

Heliports

Compatibility planning for heliports presents another uncommon set of circumstances for ALUCs. As discussed in Chapter 2, the first consideration is to decide which heliports should have compatibility plans. At least in theory, any heliport which must have a permit from the state should have a compatibility plan. The Aeronautics Act requires all public-use heliports not located on an airport and all special-use heliports to obtain a Heliport Permit. Notable among the heliports in the latter category are those at hospitals. This ostensible requirement notwithstanding, very few ALUCs have adopted compatibility plans for heliports.

Any compatibility plan prepared for a heliport needs to take into account the unique operational characteristics of helicopters. Because of the steep approach and departure profiles which helicopters normally fly, they are effectively operating in an en route manner once beyond a short distance from the heliport (FAR Part 77 airspace surfaces extend just 4,000 feet from the landing pad). Within the immediate vicinity of a heliport, helicopter noise impacts can be relatively intensive on a single-event scale. However, except for the few heliports which experience a high volume of operations, cumulative noise impact contours are very small. Also, the limited accident data available for helicopters suggests that significant safety concerns are generally confined to within a few hundred feet of the landing pad. Perhaps most important with respect to safety is the necessity of keeping established approach/departure corridors clear of obstructions.

Given this combination of factors, some restrictions on land use development is appropriate within the immediate vicinity of public-use and special-use heliports. However, except where warranted by high activity levels, more extensive restrictions are normally unnecessary.